The invention further relates to a protein having the amino acid sequence of SEQ ID NO:2.

The invention still further relates to variants of the protein of SEQ ID NO:2 and to fusion proteins comprising all or part of SEQ ID NO:2.

The invention also relates to polynucleotides encoding all or part of the protein of SEQ ID NO:2.

The invention further relates to a polynucleotide having the sequence of SEQ ID NO:1, and to polynucleotides having at least 85% homology to SEQ ID NO:1.

The invention relates to antibodies, including monoclonal and polyclonal antibodies, that recognize all or part of the Nogo protein of the invention, and to fragments of antibodies including single-chain antibodies.

The invention further relates to methods of identifying the Nogo proteins of the invention using the antibodies.

The invention also relates to methods of identifying or quantifying expression products of the gene encoding the Nogo of the invention, using probes capable of hybridizing to RNA or DNA encoding the Nogo protein, under stringent conditions.

The invention relates to methods of detecting cell stress, wherein the phosphorylation of the protein of the invention is detected or measured.

The invention also relates to methods of modulating phosphorylation of Nogo proteins during stress, using agents that inhibit the phosphorylation of Nogo.

The invention further relates to methods of inactivating a Nogo protein by stimulating phosphorylation of the Nogo protein.

The invention still further relates to methods of inhibiting a Nogo protein using antisense polynucleotides and ribozymes, and to related methods of stimulating cell turnover.

BRIEF DESCRIPTION OF THE DRAWINGS

(SeqID No: 2)

Figure 1. The sequence of Nogo. (A) Amino acid sequence of Nogo deduced from the DNA sequence of the cDNA in clone 610949. Peptide sequences

obtained from the purified Nogo protein via Mass Spectrometry and Microsequencing are underlined. (B) Amino acid sequences of Nogo (SeQ ID No: 1) and NSP-B (SeQ ID No: 7) were compared using the PILEUP program. Consensus sequences are highlighted. (C) The full-length sequence of Nogo was used for homology searching against the PROSITE database with the PFAMPROT program. FLIP was the only domain with the score above threshold. The score was –150.6, with an E-value of 8.6.

Figure 2. Subcellular localization of Nogo. IMR90 cells (A,B) or GM00637 cells (C,D) were infected with a retrovirus expressing EGFP alone (A) or an EGFP-Nogo fusion protein (B,C,D). Pictures were taken at 2-3 days after infection. (E). IMR90 cells infected with retrovirus expressing EGFP alone (lanes 1 and 2) or an EGFP-Nogo fusion protein (lanes 3 and 4) were trypsinized and lysed with digitonin followed by NP-40. Digitonin-solubilized fractions (cyto; lanes 1 and 3) and NP-40-solubilized fractions (nuc; lanes 2 and 4) were separated on SDS-PAGE and transferred to a PVDF membrane. A monoclonal antibody against GFP was used for Western Blotting.

Figure 3. Tissue-specific expression of the Nogo gene. (A). A Northern Blot containing mRNA from different tissues was probed with the full-length Nogo B cDNA. Positions of the two major Nogo transcripts were shown. The position of the 2.4 KB RNA marker was also indicated. (B). The same blot was stripped and reprobed with the cDNA for β-actin. Positions of the actin transcript and the 2.4 KB RNA marker were shown.

Figure 4. Figure 4 shows hyperphosphorylation of Nogo after treatment with other stress-inducing agents. (A) IMR90 cells were treated with 0, 0.5, 1, or 4 μM of BPDE and trypsinized after 30 minutes. (B) IMR90 cells were incubated in the presence or absence of suramin (0.15 mM) for 1 hour before being irradiated with 0 or 20 J/m^2 of UVC. (C) IMR90 cells were treated with 0.7 M NaCl, 1 mM H_2O_2, 0.4 M Sorbitol or PBS (control) for 45 minutes before being lysed.

Figure 5. Figure 5 shows that hyperphosphorylation of Nogo could be abolished by specific inhibitors against p38. IMR90 cells were incubated in the presence of SB202190 and PD169316, two specific inhibitors against p38, at indicated concentrations